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Solar Water Purifier

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Abstract: In this paper we are designing a solar powered water purification system using solar PV system. An ultraviolet water treatment system is designed and built to demonstrate the capability water treatment. The system is specifically designed for the destruction of bacterial contaminants and to meet the needs of a family Only sunlight is required to power the purification system. An array of solar panel collects energy from sunlight and charges a 12V battery using Photovoltaic Effect. The stored electricity is used to power ultraviolet bulb. The UV radiation disrupts the bacteria and produces a source of portable water

Keywords: Eco-Friendly, Efficient, One Time Investment, Cheaper Maintenance

I. INTRODUCTION

Scarcity of water and quality of water have long been a concern for many people in the world. Population is increasing on an exponential scale which leads to a greater need for water reserves. Also, with the large population increase there is more pollution emitted into the environment contaminating many streams, lakes, and rivers. Contaminated water can carry different types of waterborne diseases. Drinking from untreated water can cause illness which leads to extreme pain or even death. Even water sources that are away from densely populated areas can carry pathogens detrimental to human health. There are many areas in the world that need a solution to make their polluted water potable. water purification systems provide sufficient amount of safe drinking water that the body requires on a daily basis. People need a quick solution to this problem while waiting for a more permanent fix. With a purification system, water sources that are normally too dangerous for consumption can now become useful. A personal system that is affordable for anyone can decrease the amount of preventable illnesses and deaths across the globe. The goal of this project is to design a dependable way to purify water in locations that are off the grid and don't have constant sources of clean water. The design also needs to be able to be built on a low budget considering that most of the places.

OVERVIEW

The solar radiations are collected by solar panel. This energy is then stored in a battery through a charge controller. the charge controller prevents the battery from getting overcharged. The battery is connected to the purification unit through an electromagnetic Relay. The battery is also connected to a voltage regulator. The voltage regulator converts 24v to +5v, which is required by the microcontroller. The purification unit consists of high pressure Motor, reverse osmosis system and the water tank. The high pressure creates the Necessary pressure required to carry out reverse osmosis. The microcontroller keeps Impure water tank Control switch Microcontroller Interface unit Relay Battery Charge controller High Pressure Motor Solar panel Pure Water Tank System Voltage Regulator R International journal of pure and applied mathematics special issue 7864 a watch to the level of water in the water tank and prevents it from over flow. Through this process we obtain the purified water in the water tank.

II. PROPOSED WORK

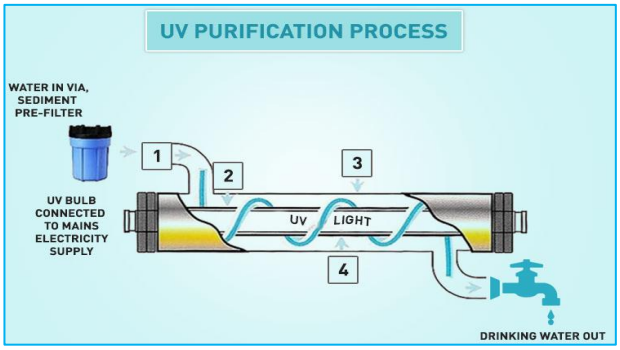

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Fig 1

Fig 2

Fig 3

III. IMPLEMENTATION DETAILS

Type of Purification: There are many methods that can be used for purifying water. Salt water can be desalinated and bacteria infected water can be decontaminated. The areas that would be in need of this system are not always along the ocean so the system was designed with a focus on destroying bacteria and viruses. The method that was selected for this project was ultraviolet radiation for the inactivation of microorganisms.

Photovoltaic Panel: A photovoltaic panel generates power for the ultraviolet bulbs and charges the battery. The panel generates the most amount of electricity when it is in direct sunlight and angled perpendicular to the sun. The panel is positioned on the top comer of the system so that it can rotate freely. It sits on a rotating rod about halfway up the panel and rotates around the rod. An extending rod is connected to the bottom so that is can be extended and locked at the optimum angle, perpendicular to the sun. A single panel can provide more than enough electricity for one UV bulb. The battery is charged to store power.

Ultraviolet Bulb: Ultraviolet bulbs commonly emit light at a wavelength of 254 nm. At this wavelength. Adjusting the volume of water in the tank and the length of the bulb, the radial distance can be determined knowing the exposure needed for cleansing common natural water. The bulb needs to be submerged in the water for direct contact. A secure chamber over the bulb connections is required to prevent any contact between the electrical wiring and the water.

Battery: The PV panels produce voltage in the form of a direct current (DC). A 12 volt DC battery is common and easy to fmd so it was selected for this system. This works properly for solar arrays. The battery is heavy and stays in place so it is placed on middle shelf without any type of fastener. There are two extruding prongs from the top of the battery. The red colored prong represents the positive charge connection and the black colored prong represents the negative charge connection. The connections have to complete a full circuit for the electrons to flow and the battery to function. The battery is connected to the charge controller and the inverter.

Charge Controller: A charge controller is used for a power system that charges a battery, such as photovoltaic panels. It keeps the battery properly fed by the power source and safe for reuse. The charge controller for this system is rated for a 12 volt, 30 amp power source. This fits with the battery selection previously made.

Inverter: An inverter changes the voltage collected from a DC source to an alternating current (AC). This is needed for the UV bulb to work properly and generate the desired wavelength for the destruction of bacterial DNA structures. The inverter came with holes in the bottom plate already drilled out so that it could be fastened to the system. It was secured to the middle shelf of the cart by

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IV. CONCLUSION

In course of the paper we have come to the conclusion that is still a lot of scope of energy production with the help of solar panels. As solar energy is being used for the purification of water, which is cheap and abundan . it can be used everywhere where electricity is not available. Here, the microcontroller which is used also prevents the water from overflowing. Moreover, uv is a good disinfectant process. This project has only capital cost and almost no running cost. Hence, it will prove to be useful in the near future.

TDS (PPM) WATER(ml)	TDS READING (Before process) (ppm)	TIME REQUIRD FOR PROCESS (Min)	TDS READING (After process) (ppm)
500ml	550ppm	2 min	325ppm
1000ml	680ppm	5min	300ppm
1500ml	600ppm	10min	290ppm

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